FIG. 1

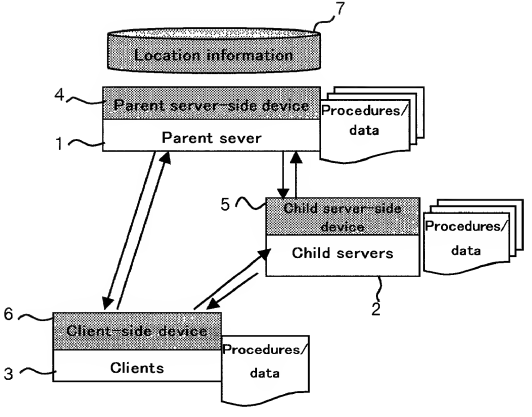

7
Location information
4
Parent server-side device
Procedures/ data
1
Parent sever
5
Child server-side device
Procedures/ data
Child servers
2
6
Client-side device
Procedures/ data
3
Clients

FIG. 2

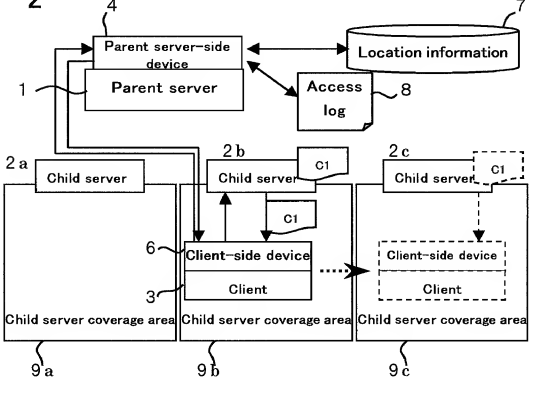

4
7
Parent server-side device
Location information
1
Parent server
Access log
8
2a
2b
2c
Child server
Child server
C1
Child server
C1
C1
6
Client-side device
Client-side device
3
Client
Client
Child server coverage area
Child server coverage area
Child server coverage area
9a
9b
9c

FIG. 3

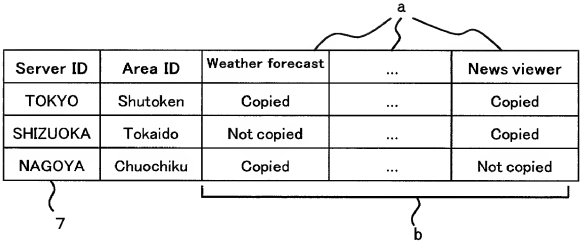

a
Server ID
Area ID
Weather forecast
...
News viewer
TOKYO
Shutoken
Copied
...
Copied
SHIZUOKA
Tokaido
Not copied
...
Copied
NAGOYA
Chuochiku
Copied
...
Not copied
7
b

FIG. 4

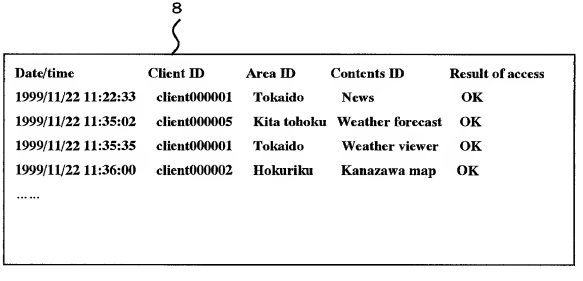

8
Date/time
Client ID
Area ID
Contents ID
Result of access
1999/11/22 11:22:33
client000001
Tokaido
News
OK
1999/11/22 11:35:02
client000005
Kita tohoku
Weather forecast
OK
1999/11/22 11:35:35
client000001
Tokaido
Weather viewer
OK
1999/11/22 11:36:00
client000002
Hokuriku
Kanazawa map
OK
.....

FIG. 5

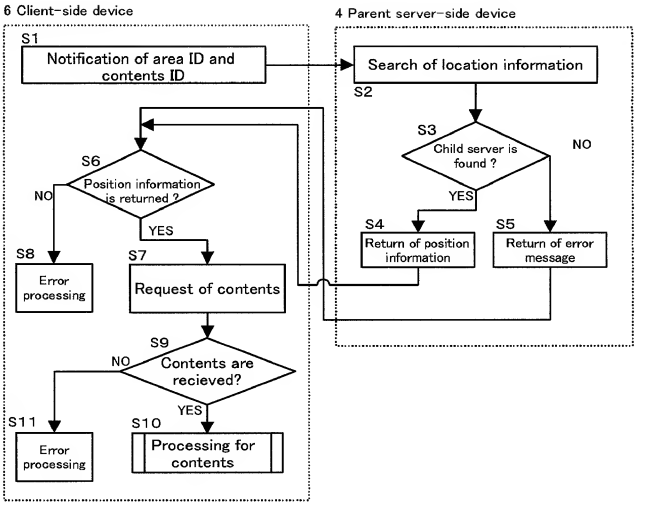

6 Client-side device
4 Parent server-side device
S1
Notification of area ID and contents ID
Search of location information
S2
S3
Child server is found ?
NO
YES
S6
Position information is returned ?
NO
YES
S4
Return of position information
S5
Return of error message
S8
Error processing
S7
Request of contents
S9
Contents are recieved?
NO
YES
S11
Error processing
S10
Processing for contents

FIG. 6

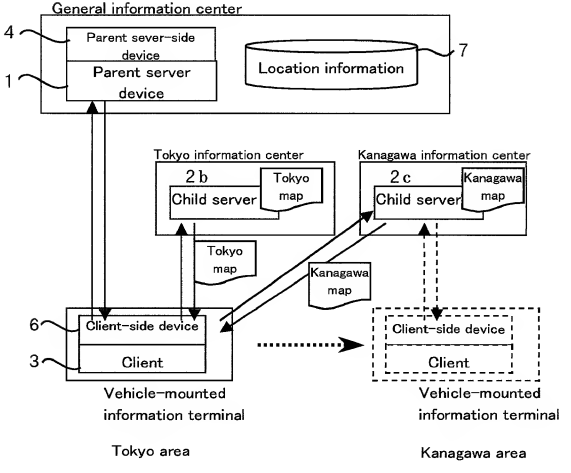

General information center
4
Parent sever-side device
Parent server device
1
Location information
7
Tokyo information center
2b
Child server
Tokyo map
Kanagawa information center
2c
Child server
Kanagawa map
Tokyo map
Kanagawa map
6
Client-side device
Client
3
Vehicle-mounted information terminal
Tokyo area
Client-side device
Client
Vehicle-mounted information terminal
Kanagawa area

FIG. 7

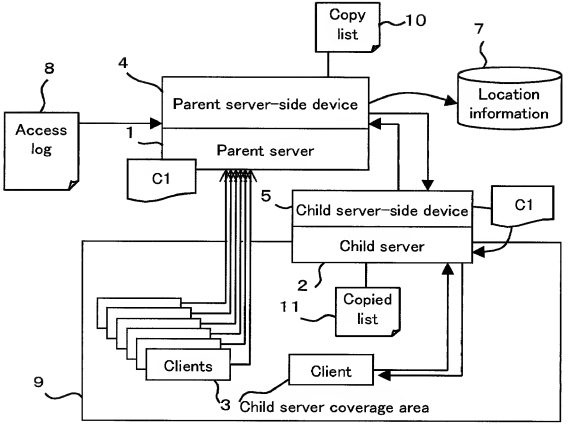

Copy list
10
7
8
4
Parent server-side device
Location information
Access log
1
Parent server
C1
5
Child server-side device
C1
Child server
2
11
Copied list
Clients
Client
9
3
Child server coverage area

FIG. 8

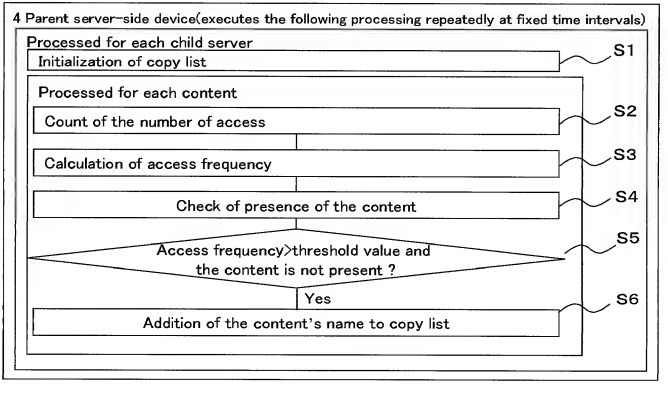

4 Parent server-side device(executes the following processing repeatedly at fixed time intervals)
Processed for each child server
Initialization of copy list
S1
Processed for each content
Count of the number of access
S2
Calculation of access frequency
S3
Check of presence of the content
S4
Access frequency>threshold value and the content is not present ?
S5
Yes
Addition of the content's name to copy list
S6

FIG. 9

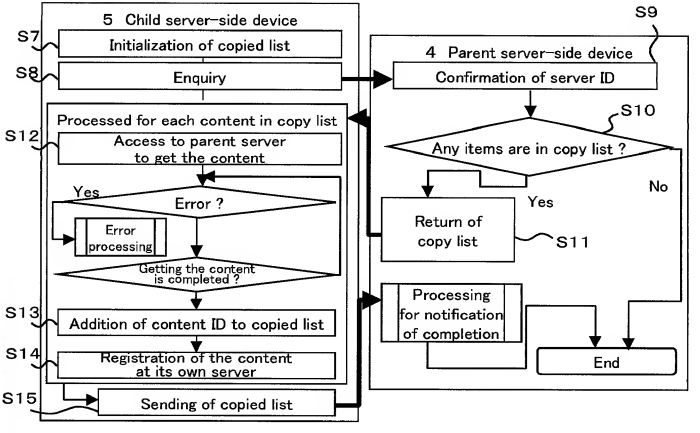

5 Child server-side device
S7
Initialization of copied list
S8
Enquiry
Processed for each content in copy list
S12
Access to parent server to get the content
Yes
Error ?
Error processing
Getting the content is completed ?
S13
Addition of content ID to copied list
S14
Registration of the content at its own server
S15
Sending of copied list
S9
4 Parent server-side device
Confirmation of server ID
S10
Any items are in copy list ?
No
Yes
Return of copy list
S11
Processing for notification of completion
End

FIG. 10

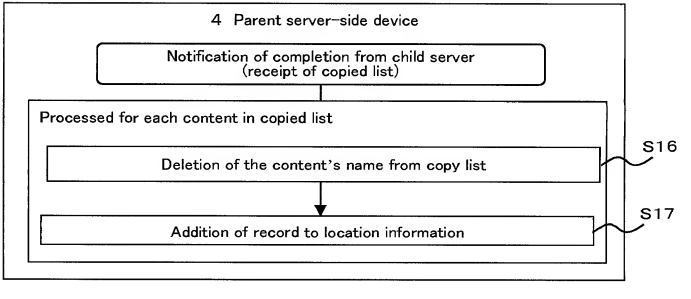

4 Parent server-side device
Notification of completion from child server (receipt of copied list)
Processed for each content in copied list
S16
Deletion of the content's name from copy list
S17
Addition of record to location information

FIG. 11

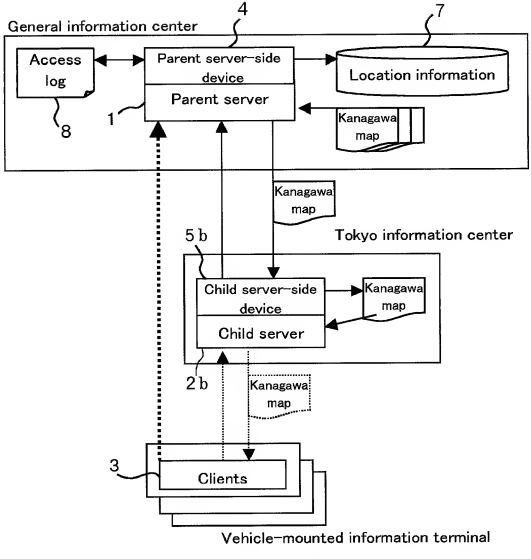

General information center
4
7
Access log
Parent server-side device
Parent server
Location information
Kanagawa map
1
8
Kanagawa map
Tokyo information center
5b
Child server-side device
Kanagawa map
Child server
2b
Kanagawa map
3
Clients
Vehicle-mounted information terminal
Tokyo area

FIG. 12

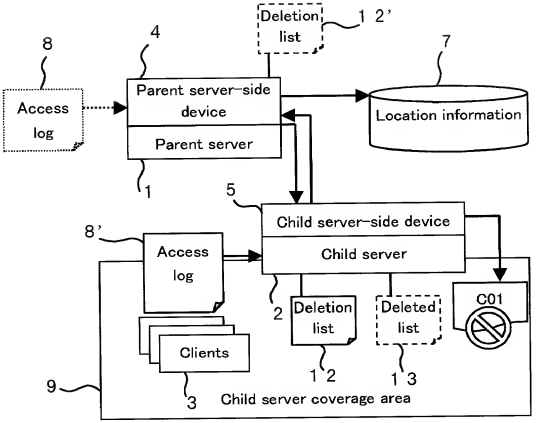

Deletion list
12'
8
4
7
Access log
Parent server-side device
Parent server
Location information
1
5
Child server-side device
Child server
8'
Access log
2
Deletion list
Deleted list
C01
Clients
12
13
9
3
Child server coverage area

FIG. 13

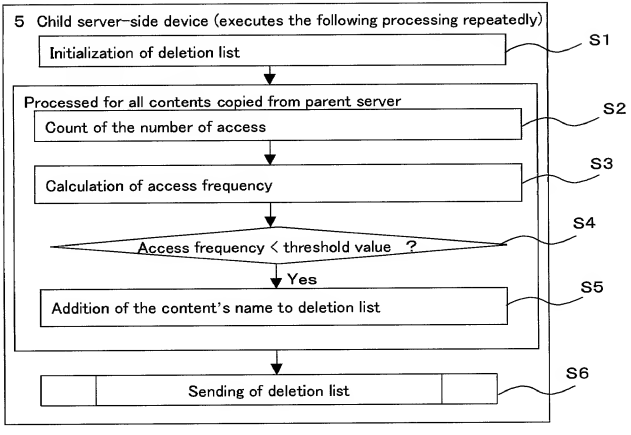

5 Child server-side device (executes the following processing repeatedly)
Initialization of deletion list
S1
Processed for all contents copied from parent server
Count of the number of access
S2
Calculation of access frequency
S3
Access frequency < threshold value ?
S4
Yes
Addition of the content's name to deletion list
S5
Sending of deletion list
S6

FIG. 14

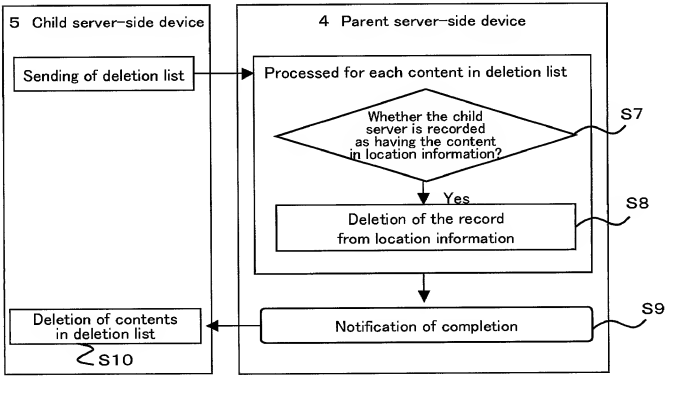

5 Child server-side device
4 Parent server-side device
Sending of deletion list
Processed for each content in deletion list
Whether the child server is recorded as having the content in location information?
S7
Yes
Deletion of the record from location information
S8
Notification of completion
S9
Deletion of contents in deletion list
S10

FIG. 15

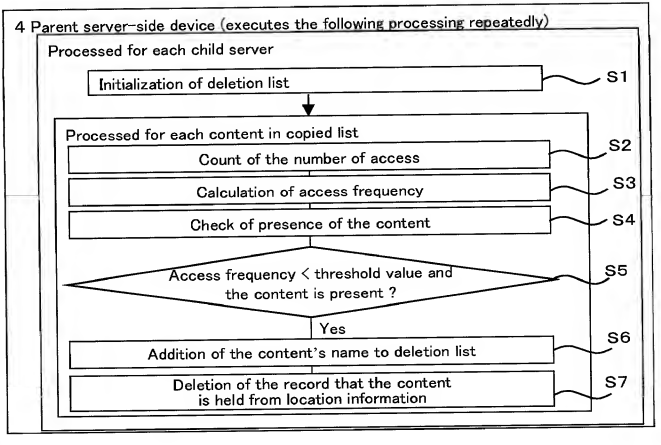

4 Parent server-side device (executes the following processing repeatedly)
Processed for each child server
Initialization of deletion list
S1
Processed for each content in copied list
Count of the number of access
S2
Calculation of access frequency
S3
Check of presence of the content
S4
Access frequency < threshold value and the content is present ?
S5
Yes
Addition of the content's name to deletion list
S6
Deletion of the record that the content is held from location information
S7

FIG. 16

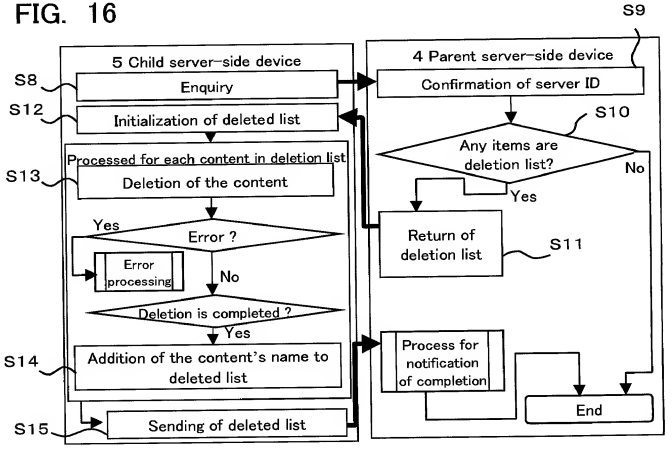

5 Child server-side device
4 Parent server-side device
S9
S8
Enquiry
Confirmation of server ID
S12
Initialization of deleted list
S10
Any items are deletion list?
No
Yes
Processed for each content in deletion list
S13
Deletion of the content
Yes
Error ?
Return of deletion list
S11
Error processing
No
Deletion is completed ?
Yes
S14
Addition of the content's name to deleted list
Process for notification of completion
End
S15
Sending of deleted list

FIG. 17

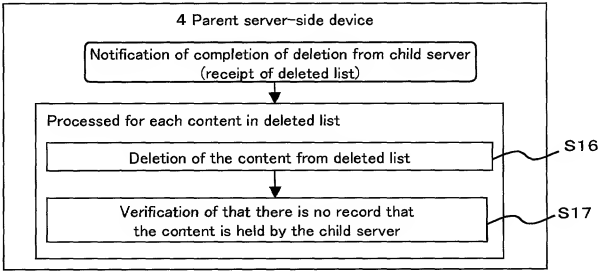
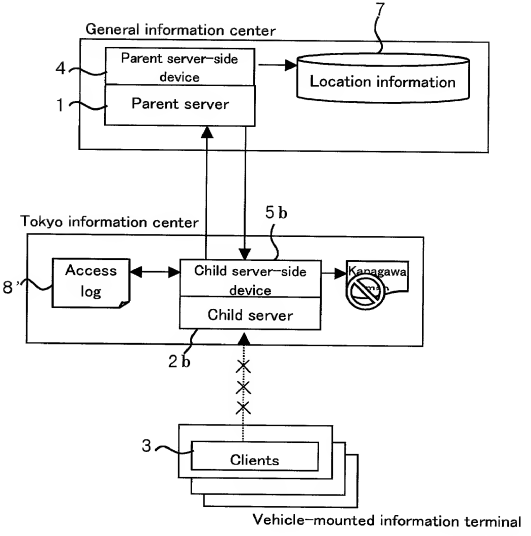

4 Parent server-side device
Notification of completion of deletion from child server (receipt of deleted list)
Processed for each content in deleted list
Deletion of the content from deleted list
S16
Verification of that there is no record that the content is held by the child server
S17

FIG. 18



Tokyo area

FIG. 19

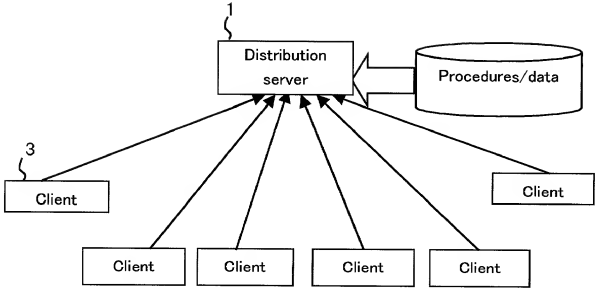
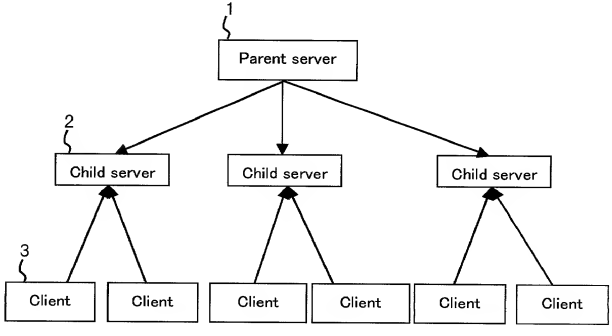

1
Distribution server
Procedures/data
3
Client
Client
Client
Client
Client
Client
Client

FIG. 20


1
Parent server
2
Child server
Child server
Child server
3
Client
Client
Client
Client
Client
Client